

STUDIES IN THE EUPATORIEAE (ASTERACEAE). LXXXV.

ADDITIONS TO THE GENUS AGERATINA WITH A

KEY TO THE COSTA RICAN SPECIES.

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Ageratina, as circumscribed in our earlier work (King & Robinson, 1970) is one of the largest genera in the Eupatorieae and contains many of the most difficult species complexes in the tribe. The genus needs much work at the species level and some such efforts are recorded here. Papers dealing with members of the genus have been produced by Adams, 1971, Grashoff and Beaman, 1969, McVaugh, 1972, using the old generic concept of Eupatorium and new combinations are provided here. Some errors and oversights have been noted in our previous work and these are also treated here. Perhaps most important here, however, are the descriptions of a large number of new species discovered in our studies. Many of these result from a special study of the genus in Costa Rica for which we have seen almost all the relevant type material. For this group of species all previous identifications including our own have proven almost totally unreliable. A detailed key is provided for the Costa Rican species.

The diversity in the genus Ageratina is only partially shown in the initial subdivision into subgenera attempted by us. A few species are difficult to assign to the proper subgenus but the situation is not as difficult as would seem from the editorial error in the original paper, where a series of species belonging to subgenus Ageratina were listed under Neogreenella, A. isolepis (B.L. Robinson) R.M. King & H. Robinson, A. ixiocladon (Benth ex Oerst.) R.M. King & H. Robinson, A. kupperi (Suesseng.) R.M. King & H. Robinson, A. lasia (B.L. Robinson) R.M. King & H. Robinson, and A. lemmonii (B.L. Robinson) R.M. King & H. Robinson. One of the original four subgenera has been raised to generic rank in a subsequent paper (King & Robinson, 1972). We make no attempt at this time at further refinements of the subgenera. The new species and new combinations are members of the subgenus Ageratina unless indicated otherwise.

The chromosome number $X = 10$ is most common in the Eupatorieae but the basic chromosome number $X = 17$

is characteristic of the genus Ageratina and $X = 16$ is known for the related genus Oxylobus. The closely related genera Jaliscoa, MacVaughiiella and Piptothrix have not been counted yet but may be expected to show $X = 17$. One species in this complex, Ageratina aschenborniana (Schauer) R.M. King & H. Robinson, has been reported from Guatemala (King 3182) as $N = 20$ with one to several fragments (Turner, Powell, & King, 1962). Another specimen from Costa Rica (King 5377) has an uncertain count of $N = 20 + 2II$. A third specimen, also from Costa Rica (King 5396) has the more likely count of $N = \text{ca. } 17 II$. For the present, the count of $N = 20$ in A. aschenborniana seems questionable.

Some information has accumulated regarding the medicinal and other chemical aspects of a few species of Ageratina. Apparently overlooked by recent workers are the comments of Weberbauer cited by B.L. Robinson (1919) regarding A. sternbergiana (A.P. Decandolle) R.M. King & H. Robinson. "The species according to Dr. Weberbauer is locally called hualmi-hualmi. He also states that the fresh roots, softened in lukewarm water, are employed as an abortive, and that a tea prepared from the leaves is used for kidney and bladder troubles." Similar abortive properties have been noted more recently in another Eupatorian species, Stevia rebaudiana (Bertoni) Hemsl. of Paraguay. An additional medicinal aspect of the genus is the "milk sickness" caused by tremetol found in A. altissima (L.) R.M. King & H. Robinson as discussed by Hass (1970). In view of the known chemical peculiarities of the genus there is reason to question the nature of the oil droplets we have observed in the leaves of A. barbensis described below.

The following new combinations and new species are added to the genus Ageratina. Notes and specimen citations are given also for some species previously transferred to the genus.

Ageratina abronia (Klatt) R.M. King & H. Robinson, comb. nov. Eupatorium abronium Klatt, Ann. Naturh. Hofmus. Wien 9: 355. 1894. Mexico.

Ageratina allenii (Standl.) R.M. King & H. Robinson, comb. nov. Eupatorium allenii Standl., Publ. Field Mus. Nat. Hist. Bot. Ser. 18: 1457. 1938. Costa Rica: Alajuela. Summit of Volcan Poas. Alt. 2500-2575 meters. Dec 1, 1937-Jan. 1, 1938. Paul Allen 597 (Holotype F!).

Ageratina anchista (Grashoff & Beaman) R.M. King & H. Robinson comb. nov. Eupatorium anchistum Grashoff

& Beaman, Rhodora 71: 567. 1969. Mexico.

Ageratina anisochroma (Klatt) R.M.King & H.Robinson, Phytologia 19: 218. 1970. Costa Rica: Alajuela: Region of Zarcero. Alt. 4500 ft. Jan. 20, 1938. Austin Smith H 190(F); Sommet du Volcan de Poas. Alt. 2644 meters. Oct. 1896, Tonduz 10820 (US); Upper slopes of Volcan de Poas, Alt. 2500-2640 meters. Feb. 17, 1924, Standley 34905 (US); South slopes of Volcan Poas, Elev. ca. 8300ft. 29 Jan. 1972, R.M.King 6428 (US); Viento Fresco, Alt. 1600-1900 meters, Feb. 13, 1926, Standley & Torres 47723 (US); Cartago: Cut-over cloud forest area, near La Sierra, about 25 km south of Cartago. Cordillera de Talamanca. Alt. 2000 meters. Jan. 23, 1965, Williams, Molina, Williams, Gibson 28126 (F,US); Mountains along the Interamerican Highway, 16 kms south of Cartago, 24 August 1962, R.M.King 5397 (US); Volcan de Turrialba, alt. 2900 meters, Jan. 1899, Pittier 7500 (US); Southern slope of Volcan de Turrialba, near the Finca del Volcan de Turrialba. alt. 2000-2400 meters, Feb. 22, 1924, Standley 35076 (US); Vicinity of La Congreja about 10 km south of El Tejar, Cordillera de Talamanca, alt. 1750-1850 meters, Feb. 1, 1963, Williams, Jimenez, Williams 24104 (F); alt. 1800 meters, May 11, 1956, Williams 19837 (F); Volcan Irazu, March 1888, Biolley 1042 (BR); Region of La Esperanza, southern slope of Volcan de Irazu, Feb. 23, 1924, Standley 35370 (US); Cerro Doan, 3 km east of Cachi, 1450 meters, Apr. 23, 1969, Lent 1610 (F,US); Heredia: Cerro de las Lajas, north of San Isidro, alt. 2000-2400 meters, March 7, 1926, Standley 51418 (US); Vara Blanca de Sarapiquí, north slope of Central Cordillera, between Poas and Barba volcanoes, alt. 1860 meters, Jan. 1938, Skutch 3470 (US); alt. 1500-1750 meters, July-Sept. 1937, Skutch 3221 (US); San Jose: La Palma, alt. 1600 meters, Feb 3, 1924, Standley 33197 (US); La Hondura, alt. 1200-1500 meters, March 9, 1926, Standley & Valerio 51881 (US); alt. 1300-1700 meters, March 16, 1924, Standley 37587, 36554 (US); Arriba de El Empalme, alt. 2000 meters, Enero 18, 1965, Jimenez 2771 (F); Above El Empalme. Cloud forest area, Cordillera Talamanca, mountain of Cerro de La Muerte, 2000 meters, Feb. 26, 1966, Molina, Burger, and Wallenta 17915 (F); ca. 19 kms generally NW of Empalme, elev. 6200 ft. 22 Jan. 1972, King 6411 (US); In mountain forest north of San Isidro del General, Cordillera de Talamanca, alt. 1800 meters,

May 12, 1956, Williams 19937 (F); alt. 1750- 2000 meters, Feb. 5, 1963, Williams, Jimenez, Williams 24338 (US); Cerro de las Vueltas, alt. 2700-3000 meters, Dec. 29, 1925-Jan. 1, 1926, Standley & Valerio 43977 (US); Las Nubes, alt. 1500-1900 meters, March 20-22, 1924, Standley 38603, 38598 38430 (US); Cerro Chirripo, along the Río Talari at the intersection of the parramo and forest, elevation 3250 meters, 5 April 1969, Davidse & Pohl 1580 (US); Cuesta de Tarrazu, IV 1893, 1900 meters, Tonduz 7797 (Type of Eupatorium polanthum Klatt, BR!). Panama: Chiriquí: West slope of El Baru between 7000-8000ft. elevation, 27 March 1970, Tyson & Loftin 5996 (US).

Ageratina aschenborniana (Schauer) R.M. King & H. Robinson, *Phytologia* 19: 212. 1970. Costa Rica: Alajuela: Viento Fresco, alt. 1600-1900 meters, Feb. 13, 1926, Standley & Torres 47914 (US); Region of Zarcero, alt. 6300 ft. Feb. 23, 1938, Smith H 354 (F); Cartago: Cartago, alt. 2300 meters, April 7, 1963, Jimenez 610 (US); Vicinity of Cartago, alt. 1425 meters, Feb. 1924, Standley 33357 (US); El Muneco, alt. 1400-1500 meters, March 6-7, 1926, Standley & Valerio 51153 (US); Mountain slopes south of Orosi, elevation ca. 1800 meters, Aug. 22, 1962, King 5377 (US); Orosi, March 30, 1924, Standley 39604 (US); Cerro de La Muerte, elevation ca. 3000 meters, Aug. 24, 1962, King 5396 (US); Cerro de La Carpintera, alt. 1500-1850 meters, Feb. 1924, Standley 35735 (US); Heredia: Yerba Buena northeast of San Isidro, alt. about 2000 meters, Feb. 22-28, 1926, Standley & Valerio 50078 (US); Vera Blanca de Sarapiquí, north slope of Central Cordillera, between Poas and Barba volcanoes, alt. 1710 meters, Feb. 1935, Skutch 3503 (US); San Jose: Along Río Blanco, northeast of El Copey, alt. 1800-1900 meters, Dec. 16, 1925, Standley 41896 (US); Plantations de mais de Santa Rosa du Copey, alt. 1800 meters, Feb. 1898, Tonduz 11765 (US); Near Finca La Cima, above Los Lotes, north of El Copey, alt. 2100-2400 meters, Dec 21-22, 1925, Standley 42557 (US); San Marcos, alt. 1200 meters, March 3, 1890, Tonduz 2255 (US); Between Aserri and Tarbaca, alt. 1600-1900 meters, Feb. 12, 1924, Standley 34039 (US); about 25 km north of San Isidro de El General, alt. 3200 meters, Jan. 29, 1965, Williams, Molina, Williams, Gibson 28558 (US). Panama: Chiriquí: Pastures around El Boquete, alt. 1000-1300 meters, March 2, 1911, Pittier 2900 (US); Boquete, 6000 ft. Jan. 18, 1938, Davidson 154 (US); Cerro Punta, elev.

ca. 2150 meters, Feb.-March 1965, Tyson 1024 (US).

Ageratina badia (Klatt) R.M.King & H.Robinson, Phytologia 19: 212. 1970. Costa Rica: Clairieres le long du chemin de la Muerte a la Division, 2900-2160 meters, Jan. 1891, Pittier 3407 (Type of Eupatorium badium Klatt GH!); Clairieres entre La Division, 2100 meters et L'Alto del Palmital. Vallee du Rio General (1100 meters) 21 Jan. 1891, Tonduz 3429 (Type of Eupatorium chlorophyllum Klatt BR!).

Ageratina barbensis R.M.King & H.Robinson, sp. nov.

Suffrutices erecti usque ad 1 m alti. Caules teretes parce pilosi. Folia opposita longe petiolata, petiolis 1.0-3.5 cm longis; lamina late ovata usque ad 12 cm longa, 7 cm lata, sensim acuminata serrulata vel crenata, basi late cuneata, supra in nervis hirtella, subtus pallescens in nervis et nervulis majoribus breviter pilosa, nervis secundariis ascendentibus in quadrata basilare saepe binatim fasciculatis, corporis oleosis interne praesentis. Inflorescentiae late corymbosae, pedicellis pilosis 1-6 mm longis. Capitula ca. 5 mm alta, floribus ca. 20; involucri squamae ca. 15, eximbricatae bi-triseriatae subaequilongae, anguste lanceolatae, vix attenuatae, fimbriatae 35-40 mm longae; corolla alba inferne anguste tubularis superne late infundibularis, tubis ca. 1.5 mm longis, extus plerumque setiferis, limbis 2.0-2.5 mm longis, lobis longe triangularibus extus setiferis; filamenta antherarum in parte superiore aliquantum incrassata, thecae antherarum 1.0-1.2 mm longae basi distincte breviter hastatae, appendicibus $1\frac{1}{2}$ longioribus quam latioribus; styli inferne parum nodulosi, appendicibus dense subargute papillois; achaenia in costis setifera, setis brevibus numerosis; carpopodia breviter subcylindrica, cellulis oblongis, parietibus firmis; pappi setae ca. 25 basi subfragiles ad apicem vix dilatatae, series secundaria subnulla. Grana pollinis ca. 22-24 μ diam.

Type: COSTA RICA: Heredia: Cut over forest, southern slopes of Volcan Barba, along Camino Guarano, ca. 22 kms N of Barba, El. ca. 9000ft., Jan. 21, 1972. Abundant small shrubs up to one meter tall, partial shade, flowers white. Robert Merrill King 6409 (Holotype US!); (Paratype R.M.King 6409A US!).

The new species is in the group with A. badia and A. allenii having cuneate leaf bases and short cylindrical carpopodia. The stem of A. barbensis is hirsute like A. badia but the achenes have only very short projecting setae on the costae and the phyllaries

are shorter tipped with marginal hairs forming a rather dense fringe. The new species is most distinctive in the innumerable minute oil droplets in the leaves which are reminiscent of the laticifers of Critonia but smaller. These small bodies occur in the distinct intercellular cavities in the leaf and the contents disappear over a period of hours from sections mounted in water.

Ageratina (Neogreenella) boyacensis R.M.King & H.Robinson, sp. nov. Frutices erecti usque ad 2 m alti. Caules teretes appresso-puberuli. Folia opposita breviter petiolata, petiolis 8-11 mm longis, laminis late ovatis 6.0-8.5 cm latis breviter acutis vel anguste rotundatis margine crenato-serratis basi late breviter cuneatis, supra et subtus minute parce pilosis, nervis secundariis pinnatis. Inflorescentiae late dense corymbosae, pedicellis 1-4 mm longis minute puberulis. Capitula 8-9 mm alta, floribus 5; involucri squamae ca. 15 subimbricatae bi-triseriatae aliquantum inaequilongae anguste oblongae vel lineares 1.5-3.0 mm longae minute apiculatae margine dense hirsutae extus parce minute puberulae; corollae 4.5-5.5 mm longae anguste infundibulares extus glanduliferae, tubis non distinctis, lobis longe triangularibus; filamenta antherarum in parte superiore ca. 450 μ longa, thecae ca. 1.3 mm longae base argute hastatae, appendicibus vix longioribus quam latioribus; styli inferne non nodulosi, appendicibus dense valde papillosis; achaenia parce glandulifera non setifera; carpodia breviter rotundata, cellulis quadratis, parietibus minute noduliferis; pappi setae ca. 30 non fragiles inferne vix scabrae superne valde scabrae interdum vix dilatatae, series secundaria indistincta parca, setis usque ad 500 μ longis. Grana pollinis ca. 27 μ diam.

Type: COLOMBIA: Boyaca. Alto carretera sobre Puente de Boyaca, matorral de paramo. Alt. 2800 meters. Feb. 24, 1940. Arbusto 2 metros; flor rosado claro. Arbelaez & Cuatrecasas 8085 (Holotype US!).

The species is related to A. mutiscuense (B.L.Robinson) R.M.King & H.Robinson by its broad ovate scarcely pubescent leaves and by its heads with 5 flowers. Differences of the new species include the appressed pubescent rather than hirsute stems, the sharply short apiculate tips of the phyllaries and the non setiferous achenes.

Ageratina burgeri R.M.King & H.Robinson, sp. nov.

Suffrutices erecti usque ad 0.5 m alti. Caules teretes puberuli vel glabrescentes. Folia opposita petiolata, petiolis 1.0-1.5 cm longis, laminis ellipticis usque ad 15 cm longis 5 cm latis sensim anguste acuminatis margine serratis vel serrulatis basi anguste longe cuneatis, subtus pallescentibus, supra et subtus subglabris in nervulis parce hirtellis, nervis secundariis valde ascendentibus utrinque ca. 5-6, nervis tertiariis mediis valde ascendentibus. Inflorescentiae late corymbosae, pedicellis puberulis 2-6 mm longis. Capitula ca. 5-6 mm alta, floribus ca. 23; involucri squamae ca. 15 eximbricatae bi-triseriatae subaequilongae anguste lanceolatae acutae ca. 4.0 mm longae; corollae albae ca. 5 mm longae inferne anguste tubulares superne late infundibulares, tubis ca. 2.0 mm longis extus plerumque glabris, limbis 2.5 mm longis, lobis longe triangularibus extus setiferis; filamenta antherarum in parte superiore angusta, thecae antherarum ca. 1.0 longae basi breviter hastatae, appendicibus 1 $\frac{2}{3}$ longioribus quam latioribus; styli inferne parum nodulosi, appendicibus dense breviter papillosis; achaenia in costis plerumque glabra; carpodia breviter subcylindrica, cellulis oblongis, parietibus firmis; pappi setae ca. 20 basi subfragiles ad apicem vix dilatatae, series secundaria brevis. Grana pollinis ca. 22-25 μ diam.

Type: COSTA RICA: Alajuela. Wet cloud forest, cut over mountains forest, Cordillera Central, near Palmira about 5 kms east of Zarcero. Alt. 2300 meters. Feb. 23, 1966. Molina, Williams, Burger, Wallenta 17782 (Holotype F!).

The new species is related to A. allenii but has distinctive leaf form and venation, near glabrous achenes with few short spicules near the tip and the base, and anther collars narrower.

Ageratina cartagoensis R.M.King & H.Robinson, sp. nov.

Suffrutices erecti usque ad 1 m alti. Caules teretes hirsuti. Folia opposita distincte petiolata, petiolis 1.0-4.5 cm longis; lamina late elliptica plerumque 5.5-14.0 cm longa 3.0-6.5 cm lata acuta vel breviter acuminata margine subserrulata vel grosse serrata base breviter cuneata supra et subtus pilosa, nervis e basi ternatis vel quinatis valde ascendentibus. Inflorescentiae late corymbosae, pedicellis dense puberulis 5-9 cm longis. Capitula ca. 6 mm alta, floribus ca. 29; involucri squamae ca. 16, eximbricatae biseriatae subaequilongae anguste ellipticae vix

acuminatae vel anguste attenuatae 3.5-5.5 mm longae; corollae albae inferne anguste tubulares superne late infundibulares, tubis ca. 1.5 mm longis extus glabris vel setiferis, limbis 1.5-2.0 mm longis, lobis longe triangularibus extus setiferis; filamenta antherarum in parte superiore non incrassata, thecae antherarum ca. 0.8 mm longae basi breviter hastatae, appendicibus $1 \frac{1}{3}$ longioribus quam latioribus; styli inferne leviter nodulosi, appendicibus dense longe patenter papillois; achaenia fusiformia valde setifera, setis aliquantum longis plerumque in costis; carpopodia breviter cylindrica, cellulis quadratis vel breviter oblongis, parietibus firmis; pappi setae ca. 20 basi fragiles ad apicem vix dilatatae, series secundaria brevia. Grana pollinis 18-26 μ diam.

Type: COSTA RICA: Cartago. Cut over forest area near El Canon, 40 km south of Cartago. Cordillera de Talamanca. Alt. 2500 meters. Jan. 26, 1965. Williams, Molina, Williams, Gibson 28191 (Holotype US!, Isotype F!). Additional specimens: Costa Rica: Cartago: Along the Rio Reventado, north of Cartago. Alt. 1460-1650 meters. Feb. 26, 1926, Standley & Valerio 49493 (US); San Jose: Beside stream in open, vicinity of El General. Alt. 1460 meters, Feb. 1939, Skutch 4196 (US).

In nervation of the leaves the new species is nearer Ageratina pazcuanensis (H.B.K.) R.M.King & H. Robinson of Mexico and Guatemala than to any other species of Costa Rica. The more northern species differs by the cuneate rather than rounded or truncate leaf bases, by the cells of the carpopodium being more oblong rather than quadrate, and by the phyllaries being more obtusely acute.

Ageratina (Neogreenella) cerifera (McVaugh) R.M.King & H. Robinson, comb. nov. Eupatorium ceriferum McVaugh, Contr. Univ. Mich. Herb. 9: 390. 1972. Mexico.

Ageratina chirquensis (B.L. Robinson) R.M.King & H. Robinson, Phytologia 19: 213. 1970. Panama: Chiriqui: Chiriqui Volcano, alt. 3600 meters, Feb. 27, 1918, Killip 3599 (US); Volcan de Chiriqui, April 1899, Sapper sn (US); Volcan Chiriqui, 3000-3374 meters, March 10-13, 1911, Pittier 3089 (US); ca. 2500-3380 meters, July 4-6, 1938, Woodson, Allen, Seibert 1077 (US); El Barú, El. 11000 ft. March 27, 1970, Tyson & Loftin 6157 (US).

Ageratina (Neogreenella) contorta (C.D.Adams) R.M.King
& H.Robinson, comb. nov. Eupatorium contortum
C.D.Adams, Phytologia 21: 408. 1971. Jamaica.

Ageratina costaricensis R.M.King & H.Robinson, sp. nov.
Frutices erecti paucè ramosi usque ad 7.5 dm alti.
Caules teretes dense purpureo-tincti puberuli. Folia
opposita petiolata, petiolis gracilibus plerumque 1.0-
1.5 cm longis; lamina ovata usque ad 4 cm longa, 2.5 mm
lata, vix acuminata, serrata vel biserrata, basi
truncata, trinervata, chartacea, parce in nervis
hirtella. Inflorescentiae laxè corymbosae, pedicellis
gracilibus puberulis plerumque 3-12 mm longis.
Capitula ca. 6 mm alta, floribus ca. 20; involucri
squamae 16-18, eximbricatae bi-triseriatae subaequi-
longae, anguste lanceolatae, breviter attenuatae 4.0-
5.0 mm longae, corolla alba vel rosea, inferne anguste
tubularis superne campanulata, tubis ca. 1.5 mm longis
glabris vel hirsutis, limbis ca. 1.5-2.0 mm longis,
lobis longe triangularibus extus setiferis; thecae
antherarum 0.8-1.0 mm longae, basi distincte hastatae,
appendicibus $1\frac{1}{2}$ longioribus quam latioribus; styli
inferne distincte nodulosi, appendicibus longe dense
papillosis; achenia distincte setifera, setis longis
numerosis; carpopodia cylindrica, cellulis oblongis;
pappi setae ca. 20 basi fragiles ad apicem vix
dilatatae, series secundaria brevis aliquantum simplex.

Type: COSTA RICA: Cartago: Km 73 along Carretera
Interamericana S of San Jose, Cordillera de Talamanca.
El. 2775 meters. 22 July 1966. Gerrit Davidse 697
(Holotype US!). Additional specimens: Costa Rica:
Cartago: Region of La Esperanza, southern slope of
Volcan de Irazu. Feb. 23, 1924. Standley 35367 (US);
Southern slopes of Volcan de Turrialba, near the Finca
del Volcan de Turrialba; alt. 2000-2400 meters. Feb.
22, 1924. Standley 35300 (US); Alajuela: Wet cloud
forest, cut over mountains forest. Cordillera Central
near Palmira about 5 kms east of Zarcero. Alt. 2300
meters. Feb. 23, 1966. Molina, Williams, Burger,
Wallenta 17754 (F).

Material of the new species has been identified
in the past as Ageratina subcordata, but the latter is
a very different species with clusters of hairs inside
of the corolla. Ageratina costaricensis is also
rather distinct by its lax inflorescence. The various
specimens show a variation in corolla pubescence that
is common in the genus but the variation seems to
correlate with geography. The specimens from the

more northern volcanos show glabrous basal tubes while material from the Talamanca region has basal tubes with many long hairs.

Ageratina (Neogreenella) cuatrecasasii R.M.King & H.

Robinson, sp. nov. Frutices erecti multo ramosi. Caules teretes parce puberuli vel glabrescentes. Folia opposita breviter petiolata, petiolis 2-8 mm longis, laminis oblongo-ellipticis 3-11 cm longis 1.5-5.0 cm latis obtusis margine crenato-serratis base rotundatis vel vix cuneatis, supra et subtus glabris vel minute glandulo-punctatis, nervis secundariis pinnatis vel in partibus basilaribus laminarum infirme trinervatis. Inflorescentiae corymbosae, pedicellis minute puberulis vel subglabris plerumque 1-2 cm longis interdum distincte unibractiferis. Capitula 8-12 mm alta, floribus ca. 30-45; involucri squamae "violaceae" induratae ca. 20 subimbricatae biseriatae subaequilongae anguste lanceolatae vel lineares acutae extus dense minute glanduliferae leviter striatae 6-9 longae; corollae "lilacinae" 5.5-6.5 mm longae anguste infundibulares, tubis non distinctis, lobis longe triangularibus extus parce glanduliferis; filamenta antherarum in parte superiore ca. 400 μ longa, thecae ca. 2 mm longae basi cordatae, appendicibus 1 $\frac{1}{2}$ longioribus quam latioribus; styli inferne vix vel leniter nodulosi, appendicibus dense papillosis; achaenia dense glandulifera; carpopodia brevia prominula rotundata, cellulis quadratis, parietibus firmis; pappi setae ca. 30 vix fragiles ad apicem interdum leniter dilatatae, series secundaria distincta plerumque 300-500 μ longa. Grana pollinis 27-30 μ diam.

Type: COLOMBIA: Magdalena: Sierra de Perija, east of Manaure: Quebrada de Floridablanca, Andean forest and bushes, 2700-2800 meters alt. Nov. 9, 1959.

Cuatrecasas & Romero Castaneda 25154 (Holotype US!). Additional specimen: Colombia: Magdalena: Sierra de Perija, east of Manaure: Sabana Rubia, paramo 3000-3100 meters alt. Nov. 6, 1959, Cuatrecasas & Romero Castaneda 25042 (US!).

The species has some of the aspect of the group represented by Ageratina tinifolia (H.B.K.) R.M.King & H.Robinson and A. ocanensis (B.L.Robinson) R.M.King & H.Robinson in Colombia. The new species is distinct by the longer pedicels and by the more flowers per head. There is some resemblance to A. viscosa (H.B.K.) R.M.King & H.Robinson but that species has reduced upper leaves, a laxer inflorescence and setiferous achenes.

Ageratina (Neogreenella) cupressora (Standl. & Steyererm.)
R.M.King & H.Robinson, comb. nov. Eupatorium
cupressorum Standl. & Steyererm., Publ. Field Mus.
Nat. Hist. Bot. Ser. 23: 183. 1944. Guatemala.

Ageratina (Neogreenella) cylindrica (McVaugh) R.M.King
& H.Robinson, comb. nov. Eupatorium cylindricum
McVaugh, Contr. Univ. Mich. Herb. 9: 393. 1972.
Mexico.

Ageratina diversipila R.M.King & H.Robinson, sp. nov.
Frutices erecti usque ad 2 m alti. Caules
teretes dense breviter hirsuti. Folia opposita longe
petiolata, petiolis ca. 1.0 cm longis dense hirtellis;
lamina late ovata usque ad 7.0 cm longa 3.5 cm lata
breviter acuminata subcrenata, basi breviter cuneata,
hirtella, pilis in nervis et subtus pluribus, nervis
secundariis paucis valde ascendentibus. Inflorescentiae
late paniculatae, pedicellis hispido-pilosis 2-6 mm
longis. Capitula 5-6 mm alta, floribus ca. 20;
involucris squamae ca. 15, eximbricatae bi-triseriatae
plerumque subaequilongae ca. 5 mm longae anguste
lanceolatae longo-attenuatae in apicem parce pilosae
corolla alba inferne anguste tubularis superne
infundibularis, tubis ca. 1.5 longis extus glabris,
limbis ca. 2.5 mm longis, lobis longe triangularibus
extus setiferis, setis biformibus aliquot ad apicem
clavatis multiseptatis, cellulis uniseriatis; thecae
antherarum 0.9 mm longae basi breviter hastatae,
appendicibus 1 2/3 longioribus quam latioribus; styli
inferne leviter nodulosi, appendicibus longe dense
papillois; achaenia setifera, setis aliquantum longis
plerumque in costis; carpopodia plerumque breviter
subcylindrica, cellulis elongatis; pappi setae ca. 25,
basi subfragiles ad apicem vix dilatatae, series
secundaria subnulla. Grana pollinis ca. 22-24 μ diam.

Type: COSTA RICA: San Jose. Vicinity of El
General. Alt. 1890 meters. Dec. 1936. Skutch 3045
(Holotype US!).

The new species is unquestionably close to A. badia, showing even the same form of phyllaries and the same type of slightly sclerotized capitate glands on the style branches. The new species is most clearly distinct from A. badia by the presence of the two types of hairs on the corolla lobes, the one type with a series of short broad cells at the tip. Subtle differences in the leaf shape allow macroscopic distinction of the species. The occurrence of club-tipped hairs is also a character of A. subglabra but the latter is less closely related, having differences in stem pubescence and leaf form.

Ageratina dolichobasis (McVaugh) R.M.King & H.Robinson, comb. nov. Eupatorium dolichobasis McVaugh, Contr. Univ. Mich. Herb. 9: 395. 1972. Mexico.

Ageratina esmeraldae (Cuatrecasas) R.M.King & H.Robinson, comb. nov. Eupatorium esmeraldae Cuatrecasas, An. Univ. Madrid 4(2): 221. 1935. Ecuador.

Ageratina geminata (McVaugh) R.M.King & H.Robinson, comb. nov. Eupatorium geminatum McVaugh, Contr. Univ. Mich. Herb. 9: 396. 1972. Mexico.

Ageratina (Neogreenella) halbertiana (McVaugh) R.M.King & H.Robinson, comb. nov. Eupatorium halbertianum McVaugh, Contr. Univ. Mich. Herb. 9: 398. 1972. Mexico.

Ageratina helenae R.M.King & H.Robinson, sp. nov.

Suffrutices erecti 0.5-2.0 m alti plerumque multo ramosi. Caulis teretes breviter puberuli. Folia opposita petiolata, petiolis gracilibus 1.0-3.0 cm longis; laminis late ovatis usque ad 4.0 cm longis 3.5 cm latis papyraceis breviter acutis obtuse serrulatis basi subtruncatis trinervatis utrinque parce breviter puberulis in nervis hirtellis. Inflorescentiae dense corymbosae, pedicellis gracilibus puberulis 2-6 mm longis. Capitula ca. 5 mm alta, floribus ca. 15-23; involucri squamae ca. 14 eximbricatae biseriatae subaequilongae anguste lanceolatae attenuatae ca. 4.0 mm longae; corollae albae inferne anguste tubulares superne infundibulares, tubis 1.0-1.5 mm longis, limbis ca. 1.2 mm longis, lobis triangularibus vix longioribus quam latioribus extus setiferis; thecae antherarum ca. 0.4 mm longae basi vix hastatae appendibus 1 1/3 longioribus quam latioribus; styli inferne indistincte nodulosi, appendicibus longe dense papillois; achaenia temere setifera; carpopodia cylindrica, cellulis elongatis; pappi setae ca. 20-25 ad apicem subaequaliter tenues, base subfragiles, series secundaria nulla. Grana pollinis 18-22 μ diam.

Type: GUATEMALA: San Marcos. Ravines in mixed forest on slopes of Cerro Tunbador, Sierra Madre Mountains, about 15 km west of San Marcos. Alt. 2600 meters. Dec. 15, 1962. Flowers white, shrub 0.5 meters tall. Williams, Molina, Williams 23101 (Holotype US!). Additional specimens: Guatemala: San Marcos. Ravines in mixed forest on slopes of Cerro Tumbador, Sierra Madre Mountains, about 15 km west of San Marcos. Alt. 2600 meters. Dec. 15, 1962, Williams, Molina, Williams 23102 (US!); Montane cloud forest area on out slopes

of Tajumulco Volcano, Sierra Madre Mountains about 8-10 kms west of San Marcos. Alt. $\pm$ 2300 meters, Dec. 31, 1964-Jan. 1, 1965. Williams, Molina, Williams Laskowski 26883 (US!).

The species is very close to A. molinae but differs by the shorter tubes on the corollas and by the more attenuate phyllaries. Both species might be related to A. anchista (Grashoff) R.M.King & H.Robinson of Guatemala and Honduras but the latter has a laxer inflorescence and more blunt phyllaries and more cordate leaf bases.

We take great pleasure in naming this new species in honor of Mrs. Helen Dawson of Baltimore, Maryland, who has greatly helped us in our work.

Ageratina infiernillensis R.M.King & H.Robinson, sp. nov. Suffrutices erecti vel decumbentes .20-.30 m alti, multiramosi. Caules teretes glabri. Folia opposititia breviter petiolata sensim anguste elliptica, petiolis ca. 1.0 mm longis; lamina usque ad 0.8 mm longa 0.2 mm lata, integra vel pauce crenulata, glabra. Inflorescentiae non vel pauce ramosae, pedicellis 1-3 cm longis, parce puberulis. Capitula 0.8-0.9 mm alta, floribus ca. 40; involucri squamae ca. 25 bi-triseriatae inaequilongae, plerumque 5.0-6.0 mm longae oblongo-lanceolatae, late acutae; corolla albe anguste infundibularis ca. 5 mm longa, tubis 1.5-2.0 mm longis, lobis longe triangularibus extus glabris; thecae antherarum ca. 1.8 mm longae, basi distincte breviter hastatae, appendicibus vix longioribus quam latioribus; styli inferne distincte nodulosi, appendicibus longe dense papillosis; achenia superne in costis parce setifera; carpodia cylindrica, cellulis oblongis; pappi setae ca. 25 ad apicem parum dilatatae, basi fragiles, series secundaria nulla. Grana pollinis ca. 25 μ diam.

Type: PERU: Huarochiri: Lima: Infiernillo, km 106 de la carretera Lima-Oroya. Alt. 3200-3300 meters. June 19, 1950. Suffruticosa 0.20-0.30 meters, flores blancas. Ferreya 7718 (Holotype US!).

The new species is very near the common peruvian species A. scopulora (Weddell) R.M.King & H.Robinson with the same form of the head and phyllaries. The very small narrow leaves with short petioles, and the glabrous stems and corollas are extremes not seen among variations of A. scopulora.

Ageratina ixiocladon (Benth. ex Oerst.) R.M.King & H. Robinson, Phytologia 19: 223. 1970. Costa Rica: Cartago: Paa den sydlige Skraaning af Vulkanen Irasu (9000'), 1845-1848. Orsted 51, (Type of Eupatorium ixiocladon Benth. ex Oerst. C!); Volcan Irazu, Jan. 1900, Pittier 14077 (US!); Vicinity of La Congreja about 10 km south of El Tejar, Cordillera de Talamanca. Alt. 1750-1850 meters, Feb. 1, 1963, Williams, Jimenez, Williams, 24179a (F!); Volcan de Turrialba. Alt. 2800 meters Jan. 1899, Pittier 7501 (US!); Southern slope of Volcan de Turrialba, near Finca del Volcan de Turrialba. Alt. 2000-2400 meters. Feb. 22, 1924, Standley 35167, 34994, 35043 (US!); San Jose: Cerro de las Vueltas. Alt. 2700-3000 meters. Dec. 29, 1925-Jan. 1, 1926, Standley & Valerio 43884, 43947, 43587, 43497, 43947a (US!); Above El Empalme cloud forest area Cordillera Talamanca, mountain of Cerro de la Muerte, alt. 2000 meters, Feb. 26, 1966, Molina, Burger, Wallenta 17919, 17921 (F!) Along the trail from Canaan to Chirripo via Los Angeles above the Rio Talari at 3200-3400 meters. 19-22 Jan. 1970, Burger, Liesner 7407, 7393 (F!) Panama: Chiriqui: West slopes El Baru between 8000-9000 ft. March 27, 1970, Tyson & Loftin 6116b (US!); Boquete District. Volcan de Chiriqui. El. 8000 ft. July 13, 1938, Davidson 940 (F!, US!).

Ageratina kupperi (Suesseng.) R.M.King & H. Robinson, Phytologia 19: 223. 1970. Costa Rica: San Jose: Chirripo Grande, 3830 meters, Kupper 1149, (Type Eupatorium kupperi Suesseng. M!); Additional specimens: Costa Rica: San Jose: Chirripo Grande, 3800 meters, Kupper 1155 (M!); 3430 meters, Kupper 1300 (M!); Elevation 3500 meters, April 3, 1969, Davidse & Pohl 1551 (US!); Cartago: Cordillera Talamanca, mountain of Cerro de La Muerte. Alt. 3335 meters, March 4, 1966, Molina, Burger, Wallenta 18327 (US!); 3200 meters, May 17, 1956, Williams 20070 (US!).

Ageratina (Neogreenella) lasioneura (Hook. & Arn.) R. M.King & H. Robinson, comb. nov. Eupatorium lasioneuron Hook. & Arn., Bot. Beech. Voy. 297. 1838. Mexico.

Ageratina longipetiolata (Schultz-Bip ex Rusby) R.M.King & H. Robinson, comb. nov. Eupatorium longipetiolatum

Schultz-Bip ex Rusby, Mem. Torr. Bot. Club 3, No 3: 52. 1893. Bolivia.

Ageratina modesta (Kunth) R.M.King & H.Robinson, comb. nov. Eupatorium modestum Kunth, Ind. Sem. Hort. Berol. p. 13, 1847. Mexico.

Ageratina molinae R.M.King & H.Robinson, sp. nov.

Frutices erecti vel decumbentes ca. 1 m alti. Caules teretes purpureo-tincti puberuli. Folia opposita petiolata, petiolis gracilibus 0.5-3.0 cm longis, laminis ovatis usque ad 4.5 cm longis, 3.5 cm latis, papyraceis breviter acuminatis serratis vel subintegris, basi subtruncatis trinervatis, parce breviter puberulis in nervis hirtellis. Inflorescentiae aliquantum laxe corymbosae, pedicellis gracilibus puberulis plerumque 2-9 mm longis. Capitula ca. 5 mm alta, floribus ca. 19-28; involucri squamae 16-18 eximbricatae biseriatae subaequilongae, anguste lanceolatae, plerumque longe acutae, vix attenuatae 3.5-4.0 mm longae; corollae albae inferne anguste tubulares, superne breviter campanulatae, tubis 1.5-2.0 mm longis, glabris, limbis ca. 1.0 mm longis, lobis triangularibus vix longioribus quam latioribus extus setiferis; thecae antherarum ca. 0.5 mm longae, basi truncatae vel breviter hastatae, appendicibus $1\frac{1}{2}$ longioribus quam latis; styli inferne distincte nodulosi, appendicibus longe dense papillois; achaenia parce temere setifera; carpopodia cylindrica, cellulis elongatis; pappi setae ca. 25 ad apicem subaequaliter tenues, basi subfragiles, series seconderia nulla. Grana pollinis 18-24 μ diam.

Type: HONDURAS: Morazan: Cloud forest area above San Juancito. Alt. 2000 meters. March 25, 1948. Fls. white, sprawling shrub one meter, Williams, Molina 13767 (Holotype US!). Additional specimens: COSTA RICA: San Jose: Cut over montane cloud forest area, Cordillera de Talamanca, about 25 km N of San Isidro de El General along Pan-American Highway. Alt 3200 meters. Jan. 29, 1965, Williams, Molina, Williams, Gibson 28564 (US!); Alajuela: Region of Zarcero. Alt. 5500 ft. Jan. 6, 1938, Austin Smith H 8 (F!); EL SALVADOR: Santa Ana: Moist cloud forest on Cordillera Miramundo, mountain of Montecristo. Alt. 2000-2200 meters. Jan. 27-31, 1966, Molina, Burger, Wallenta 16880 (US!).

The new species is notable for the thin texture of the leaves, for the long tubes of the corollas and for the short anther sacs. The most closely related species is A. helenae described above. Material of A. molinae was the basis for our concept of Eupatorium bimatum Standley & L.O.Williams which we transferred to Ageratina in a previous paper. True E. bimatum is a Fleischmannia near to or the same as F. microstemon (Cassini) R.M.King & H.Robinson.

Ageratina multiserrata (Schultz-Bip.) R.M.King & H. Robinson, comb. nov. Eupatorium multiserratum Schultz-Bip. in Seem. Bot. Voy. Herald 301. 1856. Mexico.

Ageratina (Neogreenella) mutiscuensis (B.L.Robinson) R.M.King & H.Robinson, comb. nov. Eupatorium mutiscuense B.L.Robinson, Contr. Gray Herb. n.s. 80: 25. 1928. Colombia.

Ageratina nelsonii R.M.King & H.Robinson, sp. nov.
Suffrutices erecti pauce ramosi. Caules teretes vel parum sexangulari appresso-puberuli. Folia opposita breviter petiolata, petiolis plerumque 10-14 mm longis, laminis lanceolatis 5-7 cm longis 2.0-2.5 cm latis leniter acuminatis margine serrulatis base cuneatis, supra sparsim minute puberulis, subtus in nervis et nervulis appresso-puberulis, nervis secundariis in quadrante basilari aliquantum congestis. Inflorescentiae late corymbosae, pedicellis dense puberulis 3-7 mm longis. Capitula 5-7 mm alta, floribus ca. 20; involucris squamae 12-15 subimbricatae biserialitae subaequilongae late lanceolatae vel oblongae breviter acuminatae parce pilosae 3.0-4.0 mm longae; corollae albae inferne anguste tubulares superne late infundibulares, tubis 1.0-1.5 mm longis, limbis 1.5-2.0 mm longis, lobis longe triangularibus extus setiferis; filamenta antherarum in parte superiore ca. 300 μ longa, thecae ca. 0.9 mm longae basi breviter hastatae, appendicibus $1\frac{1}{2}$ longioribus quam latioribus; styli inferne leniter nodulosi, appendicibus longe dense papillosis; achaenia in costis dense setifera, setis longis; carpodia breviter subcylindrica, cellulis oblongis, parietibus firmis; pappi setae 20-25 fragiles ad apicem distincte dilatatae, series secundaria distincta brevis. Grana pollinis ca. 20 μ diam.

Type: MEXICO: Guerrero: Top of Sierra Madre near Chilpancingo. Alt. 9000-10200 ft. Dec. 24, 1894, E.W.Nelson 2251 (Holotype US!).

Nelson's specimen is the basis for reports of A badia in Mexico. The stems, however, have numerous short appressed hairs. The most distinctive feature of the species is the rather broad short-acuminate phyllaries. The phyllaries resemble those of Ageratina geminata (McVaugh) R.M.King & H.Robinson but the latter differs most prominently by the leaves being sessile.

Ageratina (Neogreenella) plethadenia (Standl. & Steyerm.) R.M.King & H.Robinson, comb. nov. Eupatorium plethadenium Standl. & Steyerm., Publ. Field Mus. Nat. Hist. Bot. Ser. 23: 186. 1944. Guatemala.

Ageratina reticulifera (Standl. & L.O.Williams) R.M. King & H.Robinson, Phytologia 19: 226. 1970. Costa Rica: Cartago: Cerro de Las Vueltas. Cordillera de Talamanca. Alt. 2700 meters, Williams 16103 (Isotype of Eupatorium reticuliferum Standl. & L.O.Williams F! US!); near Km 56 on Interamerican Hwy south of Cartago. March 23, 1967. P.H.Raven 20934 (F!).

Ageratina standleyi R.M.King & H.Robinson, sp. nov. Suffrutesces erecti usque ad 1.5 m alti. Caules teretes dense hirtelli. Folia opposita longe petiolata, petiolis usque ad 3 cm longis dense hirtellis; lamina late ovata usque ad 8 cm longa, 6 cm lata, breviter acuta, plerumque obscure serrulata, basi truncata vel subcordata 3-5-nervata, supra et subtus hirtella in nervis densius. Inflorescentiae dense corymbosae, pedicellis dense hirtellis 1-6 mm longis. Capitula 5 mm alta, floribus 21-23; involucri squamae ca. 15 eximbricatae biseriatae subaequilongae, ca. 4 mm longae, anguste lanceolatae, longo-attenuatae; corolla inferne anguste tubularis superne abrupte late campanulata, tubis 1.0-1.2 mm longis, extus glabris, limbis ca. 1.5 mm longis, lobis subaequaliter triangularibus extus setiferis; thecae antherarum ca. 0.8 mm longae, basi breviter rotundatae, appendicibus $1\frac{1}{4}$ longioribus quam latioribus; styli inferne leviter nodulosi, appendicibus breviter dense papillosis; achaenia pauce breviter setifera; carpodia cylindrica, cellulis oblongis; pappi setae ca. 25, basi subfragiles ad apicem vix dilatatae, series secundaria subnulla. Grana pollinis ca. 20 μ diam.

Type: COSTA RICA: San Jose: Las Nubes, alt. ca. 1500-1900 meters. March 20-22, 1924. Wet bank; herb 4 ft. Flowers dry. Standley 38395 (Holotype US!).

The new species is near A. vulcanica (Benth.) R. M. King & H. Robinson, but the phyllaries have longer narrower non-acuminate tips with only slightly scarious margins, and the throat of the corolla is more broadly campanulate with more broadly triangular lobes.

Ageratina subcordata (Benth. ex Oerst.) R. M. King & H. Robinson, Phytologia 19: 217. 1970.

The species has been badly misinterpreted in the past but the elongate throat of the corolla and clusters of hairs inside the corolla lobes are distinguishing characters. The phyllaries are also different from those of related Costa Rican species by having both prominent hairs and glands. Eupatorium splendens Klotsch ex Polak nom. nud. is often placed in the synonymy of A. subcordata but specimens from the Schultz-Bipontinus herbarium at Paris prove to be a species of Fleischmannia.

Costa Rica: Cartago: Paa den sydlige Skraaning af Vulkanen Irasu, en Hoide af c. 8000 fod. 1845-1848, Oersted 50 (type of Eupatorium subcordatum Benth. ex Oersted C!); Irazu, 2800 meters, 1901, Pittier 14076, 14077 (US!); Volcan Irazu, alt. 3400 meters, Jan. 29, 1963, Williams & Williams 24079 (F!), 24098 (F!); near summit of Volcan Irazu. Alt. 3200 meters, March 20, 1945, Williams 16027 (F!, US!); Alt. 3500 meters, March 14, 1948, Williams & Molina 13935 (F!); Alt. 3400 meters, April 30, 1956, Williams 19404 (F!); Alt. 3100 meters, March 14, 1948, Williams & Molina 13876 (F!); Alt. 1000-11330 ft. Dec. 1, 1937- Jan. 1, 1938, Allen 684 (F!); Alt. 9700 ft. Feb. 24, 1957, Carlson 3552 (F!); Cerro de La Muerte. Alt. 3200 meters. April 10, 1949, Williams 16256 (F!); Alt. 2800 meters, May 17, 1956, Williams 20102, 20107 (F!); Alt. ca. 3200 meters, Williams, Molina, Williams, Gibson 28325 (F!); Ojo de Agua. Elev. ca. 8200 ft. Feb. 1, 1972, R. M. King 6435 (US!); Alt. 10000 ft. Feb. 1, 1965, Williams, Molina, Williams, Gibson 28853 (US!); Vicinity of La Congreja about 10 kms south of El Tejar. Cordillera de Talamanca. Alt. 1750-1850 meters, Feb. 1, 1963, Williams, Jimenez, Williams 24187 (F!); Near Km 68 on Interamerican highway south of Cartago. March 23, 1967, P. H. Raven 20959 (F!); ca. 18 kms SW of Empalme. Elev. 9200 ft. Jan. 22, 1972, R. M. King 6412 (US); San Jose: Cerro de La Muerte. Cordillera de Talamanca. Alt. 2600 meters Feb. 1, 1963, Williams, Jimenez, Williams 24174

(F!, US!); 20 kms north of San Isidro de General. Alt. 2800 meters. Jan. 29, 1965, Williams, Molina, Williams, Gibson 28509 (F!); Near La Division, north of San Isidro de El General. Alt. 2400-2900 meters. Feb. 6, 1963, Williams, Jimenez, Williams 24415 (F!), 24420 (F!); Cartago and San Jose Provinces: cut over cloud forest area, Cordillera de Talamanca near Ojo de Agua. Alt. Feb. 1, 1965, Williams, Molina, Williams, Gibson 28853 (F!).

Ageratina subglabra R.M.King & H.Robinson, sp. nov.

Frutices erecti usque ad 2 m alti. Caules parum sexangulati vel teretes appresso-puberuli. Folia opposita breviter petiolata, petiolis 1-2 cm longis; lamina elliptica plerumque 5.5-15.0 cm longa et 2.5-5.0 cm lata, acuminata margine crenulata vel serrulata base anguste cuneata supra et subtus sparse appresso-puberula, nervis plerumque pinnatis in mediis saepe binatim fasciculatis. Inflorescentiae late corymbosae, pedicellis puberulis 5-8 mm longis. Capitula ca. 5 mm alta, floribus ca. 20-22; involucri squamae ca. 15, eximbricatae plerumque biseriatae subaequilongae anguste lanceolatae vix attenuatae 4.0-5.0 mm longae; corollae albae inferne anguste tubulares superne late infundibulares, tubis ca. 1.5 mm longis extus plerumque setiferis, limbis ca. 2.0 mm longis, lobis longe triangularibus extus setiferis, setis biformibus aliquot ad apicem clavatis multiseptatis, cellulis uniseriatis; filamenta antherarum in parte superiore vix incrassata, thecae antherarum 0.8 mm longae, basi breviter hastatae, appendicibus 1 1/3 longioribus quam latioribus; styli inferne leviter nodulosi, appendicibus longe dense papillosis; achaenia setifera, setis plerumque brevibus vel partim longioribus plerumque in costis; carpopodia breviter subcylindrica, cellulis oblongis, parietibus firmis; pappi setae ca. 25-30 subfragiles ad apicem vix dilatatae, series secundaria subnulla. Grana pollinis ca. 18-20 μ diam.

Type: COSTA RICA: San Jose: Oak forest near Quebradillas, about 7 km north of Santa Maria de Dota. Alt. ca. 1800 meters. Dec. 24, 1925. Slender shrub 4 ft., flowers white. Standley 42888 (Holotype US!). Additional specimens: Costa Rica: San Jose: 6 km al NE de Santa Maria de Dota. Alt. 1735 meters, Dec. 21, 1963, Jimenez 1479 (F!); Laguna de La Chonta, north-east of Santa Maria de Dota. Alt. 2000-2100 meters. Dec. 18, 1925, Standley 42233 (US!); Vicinity of Santa Maria de Dota. Alt. 1500-1800 meters. Dec. 14-26,

1925, Standley 41627 (US!); about 7 km north of Santa Maria de Dota, alt. ca. 1800 meters. Dec. 24, 1925, Standley 42871 (US!); Near Finca La Cima, above Los Lotes, north of El Copey. Alt. 2100-2400 meters. Dec. 21-22, 1925, Standley 42556 (US!); Cloud forest area, slopes of Cordillera de Talamanca, north of San Isidro de El General. Alt. 1750-2000 meters. Feb. 5, 1963, Williams, Jimenez, Williams 24315 (F!); Vicinity of El General. Alt. 1525 meters Feb. 1939, Skutch 4200 (US!).

The new species is related to A. allenii and has similar stem pubescence, but the leaf shape and corolla pubescence are different. The leaf blades of the new species are more elliptical with the widest part and the congestion of secondary veins nearer the middle. The hairs of the corolla lobes are of two types as in A. diversipila. A superficial check has shown at least some club-tipped hairs on corollas of all but one of the specimens of A. subglabra.

Ageratina tonduzii (Klatt) R.M.King & H.Robinson, Phytologia 19: 217. 1970. Costa Rica: Cuesta de Tarrazu. 1900 meters. April 1893, Tonduz 7799 (type of Eupatorium tonduzii Klatt GH!).

The species has been misrepresented in herbaria by material of A. anisochroma and A. subglabra but the type specimen from the Gray Herbarium represents a distinct species that has apparently not been recollected. The type specimen consists of a much over-aged inflorescence with no adhering flowers, two leaves mounted separately and one flower in the packet with a mature achene. The following brief description is taken from these type fragments.

Leaves narrowly elliptical, 10 cm long, 2.5 cm wide, lateral veins pinnate and not congested, pubescence very short sparse appressed. Pedicels appressed-puberulous. Heads with ca. 28 flowers. Achenes with very short setae, a few long setae near upper end; carpopodium rather elongate, cylindrical with elongate cells.

Ageratina trapezoidea (Kunth) R.M.King & H.Robinson, comb. nov. Eupatorium trapezoideum Kunth, Ind. Sem. Hort. Berol. p 13, 1847. Mexico.

Ageratina (Neogreenella) triniona (McVaugh) R.M.King & H.Robinson, comb. nov. Eupatorium trinionum McVaugh, Contr. Univ. Mich. Herb. 9:402. 1972. Mexico.

Ageratina vulcanica (Benth. ex Oerst.) R.M.King & H. Robinson, Phytologia 19: 218, 1970. Costa Rica: Cartago: Paa den sydlige Skraaning af Vulkanen Irasu (9000'). 1845-1848, Orsted 56 (type of Eupatorium vulcanicum Benth. ex Oerst. C!). Additional specimens: Costa Rica: Cartago: El Muneco, south of Navarro. Alt. 1400 meters. Feb. 8-9, 1924, Standley 33689 (US!); Juan Vinas, Reventazon Valley. Alt. 1000 meters. April 25, 1903, Cook & Doyle 323337 (US!); San Jose: Cerro de Piedra Blanca, Jan. 31, 1924, Standley 32578 (US!); Vicinity of El General. Alt. 1490 meters, Feb. 1939, Skutch 4190 (US!); Nicaragua: San Rafael de Norte. Alt. 1200-1350 meters, March 25, 26, 1917, Miller & Griscom 14 (US!), 32 (US!), 67 (US!); Panama: Chiriqui: El Baru. Elev. 6000-7000 ft. March 27, 1970, Tyson & Loftin 5951 (US!); Volcan de Chiriqui, 4400 ft. Feb. 1938. Bro. Maurice 870 (US!); Vicinity of Casita Alta,, Volcan de Chiriqui. Alt. ca. 1500-200 meters, June 28-July 2, 1938, Woodson, Allen, Seibert 861 (US!); Vicinity of Finca Lerida. Alt. 1750 meters, July 7-11, 1940, Woodson & Scherry 211 (US!); Vicinity of Monte Lirio. Alt. 1300-1900 meters, June 27-July 13, 1935, Seibert 134 (US!).

Key to the Costa Rican species of Ageratina

1. Corollas with short-stalked glands on the outer surface, without long slender hairs; phyllaries without distinct longitudinal striations on outer surface
2. Corollas broadly expanded above from a short narrow tube; achenes with ca. 20 pappus setae which are very widely spreading when old; heads with 10-22 flowers; leaves very pale on lower surface A. anisochroma
2. Corollas narrowly funnellform; achenes with ca. 30 pappus setae which are only slightly spreading when old; heads often with less than 10 flowers;
3. Leaves elliptical, with glandular punctations on the lower surface, hairs short or lacking A. ligustrina

3. Leaves ovate, without glandular punctations,
distinct coarse hairs on lower surface
A. reticulifera
1. Corollas with distinct slender hairs on outer
surface; phyllaries with distinct longitudinal
striations on outer surface
4. Corollas with many hairs in clusters on inner
surface near bases of lobes, lobes of corollas
a fourth or less as long as the throat
A. subcordata
4. Corollas with few or no hairs on inner surface
near bases of lobes, lobes of corolla a fourth
or more as long as the throat
5. Phyllaries with only glands on outer surface,
without hairs
6. Leaves subsessile, petioles ca. 1 mm long
A. chiriquensis
6. Leaves distinctly petiolate, petioles 0.5-5.0
cm long
7. Leaves narrowly ovate to lanceolate; heads
with 11-18 flowers; corollas without any
hairs on inner surface
A. kupperi
7. Leaves ovate; heads with 19-29 flowers;
corollas with a few hairs on inner surface
near bases of lobes
A. ixiocladon
5. Phyllaries with few to many hairs on outer
surface, without glands
8. Laminae of leaves rounded to cordate at base
9. Heads usually with 30-50 flowers
A. aschenborniana
9. Heads usually with 15-25 flowers
10. Veins of leaves densely tomentose on lower
surface, bases of leaves slightly to
distinctly cordate
11. Phyllaries acute at tips with prominent
scarious margins; corollas narrowly
funnelform in upper part
A. vulcanica

11. Phyllaries attenuate without distinct
scarious margins; corollas broadly campan-
ulate in upper part A. standleyi
10. Veins of leaves short puberulous to nearly
glabrous on lower surface, bases of laminae
rounded to truncate
12. Corolla tube not as long as limb. anther sacs
0.8-1.0 mm long A. costaricensis
12. Corolla tube as long as or longer than the
limb, anther sacs ca. 0.4-0.5 mm long
13. Corolla tube 1.5-2.0 mm long, distinctly
longer than the limb; phyllaries acute to
very short attenuate A. molinae
13. Corolla tube 1.0-1.5 mm long, about as long
as the limb; phyllaries distinctly atten-
uate at the tips A. helenae
8. Laminae of leaves cuneate at base
14. Leaf prominently trinervate from near base of
lamina; carpodium with many quadrate cells
A. cartagoensis
14. Leaf laminae with lateral veins mostly pinnate
15. Heads with ca. 28-30 flowers, leaf laminae
very narrowly elliptical; carpodia
narrowly cylindrical A. tonduzii
15. Heads with ca. 20-23 flowers, leaf laminae
rhomboidal to lanceolate with lateral
nerves sometimes congested near middle or
base; carpodia rather short and broadly
cylindrical
16. Stems with very sparse or appressed pubescence
17. Lateral veins of leaf laminae strongly
ascending, margins sharply serrate;
achenes essentially glabrous A. burgeri
17. Lateral veins of basal part of leaf lamina
spreading, margins crenulate to bluntly
serrate; achenes scabrous

18. Leaf laminae widest near basal third;
stems sparsely pubescent; corolla lobes
with only one type of hair on outer
surface A. allenii
18. Leaf laminae usually widest near middle;
stems densely puberulous; corolla lobes
with hairs dimorphic, occasional hairs
ending in a series of short broad cells
A. subglabra
16. Stems densely hirsute
19. Achenes with only prickles on the costae;
phyllaries shortly acuminate with many
marginal hairs near tips; leaves with
hairs only on primary and secondary veins,
laminae with oil droplets internally that
are visible as minute pellucid spots;
glands on inner surfaces of style branches
scarcely visible A. barbensis
19. Achenes distinctly setiferous; phyllaries
slenderly attenuate with few marginal
hairs near the tips; leaves with short
hairs distributed evenly over the surface,
laminae without oil droplets internally;
glands of style branches partially
indurated and easily visible under the
compound microscope
20. Internodes 3-9 cm long; leaves slightly
acuminate with essentially entire tips
1-2 cm long; corolla lobes with hairs
all slender tipped, hairs not dimorphic
A. badia
20. Internodes 1-3 cm long; leaves rather
abruptly acuminate with short tips 5-8
mm long; corolla lobes with hairs
dimorphic, some hairs ending in a series
of short broad cells A. diversipila

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